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CLAIMS

1. Process for fabricating mixed oxide (U,Pu)O₂ nuclear fuel from weapon originating plutonium oxide (W-PuO₂), including :

- a process for fabricating MOX fuel pellets including :
 - 5 - a first blending (1) of dry processed W-PuO₂ with dry processed MOX scrap and possibly uranium oxide powder,
 - a micronization (2) and a forced sieving (3) of this first blend,
 - a second blending and a mixing (4) of the micronized and sieved first blend with uranium oxide powder,
 - 10 - an additive addition (5) and a pelletizing (6) of this mixed second blend,
 - a sintering (7) of the resulting pellets, and
- a dry processing of W-PuO₂ powder including :
 - a blending (11) of the W-PuO₂ powder with one or the other or both following materials : uranium oxide powder and/or dry processed MOX scrap,
 - 15 - a micronization (12) of this blend,
 - a compaction (13) of this micronized blend into tablets,
 - a heat treatment (14) in reducing atmosphere of these tablets that are meant, after mechanical preparation (15), to be mixed into the first blending used in the above mentioned MOX fuel pellet fabrication, and
- 20 - a dry processing of MOX fabrication scrap including :
 - a blending (21) of MOX scrap powder or crushed MOX scrap pellets, with uncontrolled impurity content, uncontrolled granulometry or uncontrolled sinterability,
 - a micronization (22) of this blend,
 - 25 - a compaction (23) of this micronized blend into tablets,
 - a heat treatment (24) in reducing atmosphere of these tablets that are meant, after mechanical preparation (15), to be mixed into said first blending used in the MOX fuel pellet fabrication.

30 2. Process as claimed in claim 1 wherein the first and second blending steps for fabricating MOX fuel pellets are combined in a single milling operation and wherein the blend is completely micronized.

3. Process as claimed in claim 1 or 2 wherein the dry processing of the W-Pu oxide and the dry processing of the MOX fabrication scrap are combined in a single sequence of process steps.

35 4. Process as claimed in any of the claims 1 to 3 wherein the gallium

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removal is obtained by a combination of the heat treatment (14) of W-PuO₂ and of a sintering process (7), the sintering parameters being selected in order to enhance said gallium removal.

5. Process as claimed in any of the claims 1 to 4 wherein the heat
5 treatment (14) of the W-PuO₂ tablets is performed at least at 1,600°C in reducing atmosphere, more particularly in a furnace with tungsten heating resistances.

6. Process as claimed in any of the claims 1 to 5, wherein is included in addition a crushing of the W-PuO₂ tablets and/or of the MOX scrap tablets before their micronization.

10 7. Process as claimed in any of the claims 1 to 6, characterized by the use of a ball mill for the powder micronization in at least one of the micronization steps (2, 12, 22).

8. Process as claimed in any of the claims 1 to 7, characterized by lubricant addition before the pelletizing or compaction in at least one of the pressing
15 steps (6, 13, 23).

9. Process as claimed in any of the claims 1 to 8, characterized by the use of MOX fuel fabrication equipment for processing W-PuO₂ and MOX scrap material.